Gas Monitoring

Federal

§ 258.23 Explosive gases control.

(a) Owners or operators of all MSWLF units must ensure that:

(1) The concentration of methane gas generated by the facility does not exceed 25 percent of the lower explosive limit for methane in facility structures (excluding gas control or recovery system components); and

(2) The concentration of methane gas does not exceed the lower explosive limit for methane at the facility property boundary.

(b) Owners or operators of all MSWLF units must implement a routine methane monitoring program to ensure that the standards of paragraph (a) of this section are met.

(1) The type and frequency of monitoring must be determined based on the following factors:

(i) Soil conditions;

(ii) The hydrogeologic conditions surrounding the facility;

(iii) The hydraulic conditions surrounding the facility; and

(iv) The location of facility structures and property boundaries.

(2) The minimum frequency of monitoring shall be quarterly.

(c) If methane gas levels exceeding the limits specified in paragraph (a) of this section are detected, the owner or operator must:

(1) Immediately take all necessary steps to ensure protection of human health and notify the State Director;

(2) Within seven days of detection, place in the operating record the methane gas levels detected and a description of the steps taken to protect human health; and

(3) Within 60 days of detection, implement a remediation plan for the methane gas releases, place a copy of the plan in the operating record, and notify the State Director that the plan has been implemented. The plan shall describe the nature and extent of the problem and the proposed remedy.

(4) The Director of an approved State may establish alternative schedules for demonstrating compliance with paragraphs (c) (2) and (3) of this section.

(d) For purposes of this section, *lower explosive limit* means the lowest percent by volume of a mixture of explosive gases in air that will propagate a flame at 25°C and atmospheric pressure.

(e) The Director of an approved State may establish alternative frequencies for the monitoring requirement of paragraph (b)(2) of this section, after public review and comment, for any owners

or operators of MSWLFs that dispose of 20 tons of municipal solid waste per day or less, based on an annual average. Any alternative monitoring frequencies established under this paragraph must:

(1) Consider the unique characteristics of small communities;

(2) Take into account climatic and hydrogeologic conditions; and

(3) Be protective of human health and the environment.

[56 FR 51016, Oct. 9, 1991, as amended at 62 FR 40713, July 29, 1997]

Illinois

Section 811.310 Landfill Gas Monitoring

a) This Section applies to all units that dispose putrescible wastes.

b) Location and Design of Monitoring Wells

1) Gas monitoring devices shall be placed at intervals and elevations within the waste to provide a representative sampling of the composition and buildup of gases within the unit.
2) Gas monitoring devices shall be placed around the unit at locations and elevations capable of detecting migrating gas from the ground surface to the lowest elevation of the liner system or the top elevation of the groundwater, whichever is higher.
3) A predictive gas flow model may be utilized to determine the optimum placement of monitoring points required for making observations and tracing the movement of gas.
4) Gas monitoring devices shall be constructed from materials that will not react with or be corroded by the landfill gas.
5) Gas monitoring devices shall be designed and constructed to measure pressure and allow collection of a representative sample of gas.
6) Gas monitoring devices shall be constructed and maintained to minimize gas leakage.
7) The gas monitoring system shall not interfere with the operation of the liner, leachate collection system or delay the construction of the final cover system.
8) At least three ambient air monitoring locations shall be chosen and samples shall be taken no higher than 0.025 meter (1 inch) above the ground and 30.49m (100 feet) downwind from the edge of the unit or at the property boundary, whichever is closer to the unit.

c) Monitoring Frequency

1) All gas monitoring devices, including the ambient air monitors shall be operated to obtain samples on a monthly basis for the entire operating period and for a minimum of five years after closure.
2) After a minimum of five years after closure, monitoring frequency may be reduced to quarterly sampling intervals.
3) The sampling frequency may be reduced to yearly sampling intervals upon the installation and operation of a gas collection system equipped with a mechanical device such as a compressor to withdraw gas.
4) Monitoring shall be continued for a minimum period of: thirty years after closure at MSWLF units, except as otherwise provided by subsections (c)(5) and (c)(6); five years after closure at landfills, other than MSWLF units, which are used exclusively

for disposing of wastes generated at the site; or fifteen years after closure at all other landfills regulated under this Part. Monitoring, beyond the minimum period, may be discontinued if the following conditions have been met for at least one year:

A) The concentration of methane is less than five percent of the lower explosive limit in air for four consecutive quarters at all monitoring points outside the unit; and

B) Monitoring points within the unit indicate that methane is no longer being produced in quantities that would result in migration from the unit and exceed the standards of subsection (a)(1).

5) The Agency may reduce the gas monitoring period at an MSWLF unit upon a demonstration by the owner or operator that the reduced period is sufficient to protect human health and environment.

6) The owner or operator of an MSWLF unit shall petition the Board for an adjusted standard in accordance with Section 811.303, if the owner or operator seeks a reduction of the postclosure care monitoring period for all of the following requirements:

A) Inspection and maintenance (Section 811.111);

B) Leachate collection (Section 811.309);

C) Gas monitoring (Section 811.310); and

D) Groundwater monitoring (Section 811.319).

BOARD NOTE: Changes to subsection (c) are derived from 40 CFR 258.61 (1996).

d) Parameters to be Monitored

1) All below ground monitoring devices shall be monitored for the following parameters at each sampling interval:

A) Methane;

B) Pressure;

C) Oxygen; and

D) Carbon dioxide.

2) Ambient air monitors shall be sampled for methane only when the average wind velocity is less than 8 kilometers (five miles) per hour at a minimum of three downwind locations 30.49 meters (100 feet) from the edge of the unit or the property boundary, whichever is closer to the unit.

3) All buildings within a facility shall be monitored for methane by utilizing continuous detection devices located at likely points where methane might enter the building.

e) Any alternative frequencies for the monitoring requirement of subsection (c) for any owner or operator of an MSWLF that disposes of 20 tons of municipal solid waste per day or less, based on an annual average, must be established by an adjusted standard pursuant to Section 28.1 of the Act and 35 Ill. Adm. Code 106. Any alternative monitoring frequencies established under this subsection (e) will:

1) Consider the unique characteristics of small communities;

2) Take into account climatic and hydrogeologic conditions; and

3) Be protective of human health and the environment.

BOARD NOTE: Subsection (d) is derived from 40 CFR 258.23(e), as added at 62 Fed. Reg. 40707 (July 29, 1997).

(Source: Amended at 22 Ill. Reg. 11491, effective June 23, 1998)

Section 811.311 Landfill Gas Management System

a) The operator shall install a gas management system if any one of the following conditions are met:

1) A methane concentration greater than 50 percent of the lower explosive limit in air is detected below the ground surface by a monitoring device or is detected by an ambient air monitor located at or beyond the property boundary or 30.5 meters (100 feet) from the edge of the unit, whichever is less, unless the operator can demonstrate that the detected methane concentration is not attributable to the facility;

2) Methane is detected at a concentration greater than 25 percent of the lower explosive limit in air in any building on or near the facility unless the operator can demonstrate that the detected methane concentration is not attributable to the facility;

3) Malodors caused by the unit are detected beyond the property boundary; or

4) Leachate is recycled in accordance with Section 811.309(e).

b) If methane gas levels exceed the limits specified in subsections (a)(1) or (a)(2), an owner or operator of a MSWLF unit shall:

1) Notify the Agency in writing, within two business days, of an observed exceedance; and

2) Implement the requirements of this Section to ensure the protection of human health.

c) Standards for Gas Venting System

1) Gas venting systems shall be utilized only as optional, temporary mitigation until the completion of an active system.

2) All materials shall be resistant to chemical reaction with the constituents of the gas.

3) The system shall be capable of venting all gas down to the water table or bottom of the liner, whichever is higher.

4) Gas venting systems shall be installed only outside the perimeter of the unit.

d) Standards for Gas Collection Systems

1) Gas collection systems may be installed either within the perimeter of the unit or outside the unit.

2) The operator shall design and operate the system so that the standards of subsections (a)(1), (a)(2), and (a)(3) will not be exceeded.

3) The gas collection system shall transport gas to a central point or points for processing for beneficial uses or disposal in accordance with the requirements of Section 811.312.

4) The gas collection system shall be designed to function for the entire design period.

The design may include changes in the system to accommodate changing gas flow rates or compositions.

5) All materials and equipment used in construction of the system shall be rated by the manufacturer as safe for use in hazardous or explosive environments and shall be resistant to corrosion by constituents of the landfill gas.

6) The gas collection system shall be designed and constructed to withstand all landfill operating conditions, including settlement.

7) The gas collection system and all associated equipment including compressors, flares, monitoring installations, and manholes shall be considered part of the facility.

8) Provisions shall be made for collecting and draining gas condensate to a management system meeting the requirements of Section 811.309.

9) Under no circumstances shall the gas collection system compromise the integrity of the liner, leachate collection or cover systems.

10) The portion of the gas collection system, used to convey the gas collected from one or more units for processing and disposal shall be tested to be airtight to prevent the leaking of gas from the collection system or entry of air into the system.

11) The gas collection system shall be operated until the waste has stabilized enough to no longer produce methane in quantities that exceed the minimum allowable concentrations in subsections (a)(1), (a)(2), and (a)(3).

12) The gas collection system shall be equipped with a mechanical device, such as a compressor, capable of withdrawing gas, or be designed so that a mechanical device can be easily installed at a later time, if necessary, to meet the requirements of subsections (a)(1), (a)(2), and (a)(3).

BOARD NOTE: Subsection (b) is derived from 40 CFR 258.23(c)(1) (1992).

(Source: Amended in R93-10 at 18 Ill. Reg. 1308, effective January 13, 1994)

Section 811.312 Landfill Gas Processing and Disposal System

a) The processing of landfill gas for use is strongly encouraged but is not required.

b) Except as allowed in subsection (g), the landfill gas processing and disposal system, including compressors, blowers, raw gas monitoring systems, devices used to control the flow of gas from the unit, flares, gas treatment devices, air pollution control devices and monitoring equipment must remain under the control of the operator and shall be considered part of the waste disposal facility.

c) No gas may be discharged directly to the atmosphere unless treated or burned onsite prior to discharge in accordance with a permit issued by the Agency pursuant to 35 Ill. Adm. Code 200 through 245.

d) Representative flow rate measurements shall be made of gas flow into treatment or combustion devices.

e) When used for the onsite combustion of landfill gas, flares shall meet the general control device requirements of new source performance standards adopted pursuant to Section 9.1(b) of the Act.

f) Standards for Onsite Combustion of Landfill Gas Using Devices Other Than Flares

1) At a minimum, landfill gas shall be measure for flow rate, heat value, and moisture content along with combustion parameters including, but not limited to, oxygen and carbon dioxide prior to treatment or combustion. Constituents of the landfill gas and combustion byproducts shall be identified for inclusion in an Agency issued permit based on the type of waste streams that are or will be in the landfill, landfill gas analysis and potential for being emitted into the air after treatment or combustion.

2) All constituents and parameters that must be measured before and after treatment or combustion shall be identified and included in a permit issued by the Agency pursuant to 35 Ill. Adm. Code 200 through 245. At a minimum, the following types of constituents must be considered for inclusion in the permit:

A) The six criteria air pollutants and the hazardous air pollutants subject to regulation under the Clean Air Act (42 U.S.C. 7401 et seq.);

B) Any list of toxic air contaminants, including carcinogens, mutagens and listed hazardous air pollutants adopted by the Board pursuant to Section 9.5 of the Act;

C) Volatile Organic Compounds;

D) Constituents present in the landfill gas; and

E) Combustion byproducts expected to be emitted from the combustion or treatment device.

g) Landfill gas may be transported offsite to a gas processing facility in accordance with the following requirements:

1) The solid waste disposal facility contributes less than 50 percent of the total volume of gas accepted by the gas processing facility or the gas processing facility is permitted to receive and process landfill gas under the Act and Board regulations. Otherwise, the processing facility must be considered a part of the solid waste management facility. In any event, no solid waste disposal facility shall transport landfill gas offsite under this Section unless it satisfies the financial assurance requirements of Section 811.704(h)(3).

2) The landfill gas shall be monitored for the parameters listed in subsection (f)(1) as well as other constituents such as, ammonia (NH_3), hydrogen sulfide (H_2S) and hydrogen (H_2) that are needed to operate the gas processing facility.

3) The gas processing facility shall be sized to handle the expected volume of gas.

4) The transportation of gas to an offsite gas processing facility shall in no way relieve the operator of the requirements of Section 811.311(a).

(Source: Amended at 22 Ill. Reg. 11491, effective June 23, 1998)

Kansas

(e) MSWLF gas monitoring.

(1) Each owner or operator of a MSWLF unit that receives putrescible waste or industrial wastes that have the potential to generate explosive gases shall establish and conduct an explosive gases monitoring program to ensure that dangerous levels of explosive gases do not occur within facility structures or at the surface or subsurface facility boundary.

(2) The monitoring program shall ensure that these conditions are met:

(A) the concentration of methane gas generated by the facility does not exceed 25% of the lower explosive limit for methane in facility structures, excluding gas control or recovery system components;

(B) the concentration of methane gas does not exceed the lower explosive limit for methane at the facility property boundary; and

(C) potential gas migration pathways are identified.

(3) The minimum monitoring frequency for explosive gases shall be quarterly and shall be based on the following factors:

(A) soil conditions;

(B) the hydrogeologic conditions surrounding the facility;

(C) the hydraulic conditions surrounding the facility; and

(D) the location of facility structures and property boundaries.

(4) If methane gas levels exceeding the limits specified in paragraph (e)(2) are detected, the owner or operator shall perform all of the following:

(A) immediately assess the potential danger posed to human health and the environment and take all necessary steps to ensure protection of human health;

(B) within seven days of detecting a gas level exceeding the limit, notify the department and place in the operating record the methane gas levels detected and a description of the steps taken to protect human health;

(C) within 60 days of detecting a gas level exceeding the limit, develop and submit to the department a remediation plan, which provides for the installation of an active or passive gas management system; and

(D) upon approval of the department, implement the remediation plan.

(f) MSWLF gas management standards.

(1) Standards for gas venting systems.

(A) All materials used in gas venting systems shall be resistant to chemical reaction

with the constituents of the gas.

(B) The gas venting system shall be capable of venting all gas down to the water table or bottom of the liner, whichever is higher.

(C) Gas venting systems shall be installed only outside the perimeter of the unit, unless it can be shown that gas venting inside the perimeter of the unit will not interfere with the liner, leachate collection system, cover, or monitoring equipment.

(2) Standards for gas collection systems.

(A) Gas collection systems may be installed either within the perimeter of the unit or outside the unit.

(B) The owner or operator shall design and operate gas collection systems so that the standards of paragraph (e)(2) are met.

(C) Gas collection systems shall transport gas to a central point or points for processing for beneficial uses or disposal, in accordance with the requirements of subsection (g) of this regulation.

(D) Gas collection systems shall be designed to function for the entire design period. The design may include changes in the system to accommodate changing gas flow rates or compositions.

(E) All materials and equipment used in the construction of gas collection systems shall be rated by the manufacturer as safe for use in hazardous or explosive environments and shall be resistant to corrosion by constituents of the MSWLF gas.

(F) Gas collection systems shall be designed and constructed to withstand all MSWLF operating conditions, including settlement.

(G) Gas collection systems and all associated equipment including compressors, flares, monitoring installations, and manholes shall be considered part of the facility.

(H) Provisions shall be made for collecting and draining gas condensate to the leachate management system or another management system approved by the department.

(I) A gas collection system shall not compromise the integrity of the liner or of the leachate collection or cover systems.

(J) The portion of each gas collection system used to convey the gas collected from one or more units for processing and disposal shall be tested to be airtight to prevent the leaking of gas from, or entry of air into, the collection system.

(K) The gas collection system shall be operated until the waste has stabilized enough to no longer produce methane in quantities that exceed the minimum allowable concentrations set out in paragraph (e)(2) of this regulation.

(L) Each gas collection system shall be equipped with a mechanical device, capable of withdrawing gas, or shall be designed so that a mechanical device can be easily installed at a later time, if necessary, to meet the allowable concentrations set out in paragraph (e)(2).

(g) MSWLF gas processing and disposal system.

(1) Each MSWLF with a permanent gas collection system shall evaluate the feasibility of processing of MSWLF gas for use.

(2) The following MSWLF gas processing devices and disposal systems shall remain under the control of the owner or operator and shall be considered part of the facility:

(A) compressors;

(B) blowers;

(C) raw gas monitoring systems;
(D) devices used to control the flow of gas from the unit;
(E) flares;
(F) gas treatment devices; and
(G) air pollution control devices and monitoring equipment.

(3) All gas discharges and gas processing and disposal systems shall conform with all local, state, and federal air quality requirements.

Minnesota

Subp. 11. **Gas monitoring, collection, and treatment system.** The concentration of any explosive gas must not exceed its lower explosion limit at the property boundary or 25 percent of its lower explosion limit in and around facility structures or any other on-site monitoring point. A gas monitoring, collection, and treatment system must be designed to meet the requirements of items A to G.

A. The gas monitoring system, at a minimum, must be capable of monitoring gas build-up in a facility structure and at the property boundary. The commissioner shall establish monitoring requirements (including water quality parameters that indicate gas migration) in the permit, closure document, order, or stipulation agreement. Field inspection to detect odors and signs of vegetative stress, and portable or in-place probes to monitor explosive gases must be included in the monitoring system.

B. Gas monitoring probes must be placed between the disposal site and on-site structures or property lines. The probes must be placed no closer to the property line than the compliance boundary defined in subpart 4, item C, to allow for installation of control measures. If the owner or operator believes that monitoring probes are unnecessary or infeasible, the owner or operator shall submit reasons to the commissioner to support this belief. The commissioner will decide on the need for monitoring probes based on the waste characteristics, fill size, surrounding soils, the water table, and the proximity to occupied buildings.

C. Probe depths and locations must be based on the soils, site geology, depth of fill, water table, and depth of frost.

D. At a minimum, each mixed municipal solid waste land disposal facility must be designed and constructed with gas vents. The number and placement of the gas vents must release gas pressure in the fill area to prevent ruptures of the cover system and to

encourage vertical gas migration.

E. The gas control systems must extend below the facility to the water table or to a subsurface soil capable of impeding the movement of gas. The gas control system must be located adjacent to the fill area.

F. The size of the gas collection system must be based on the volume and type of waste to be received at the site. The owner or operator must determine the need for a gas collection system and discuss in the engineering report how the need was determined. The commissioner shall review the determination during the permit review process and again at closure. Approval of a gas monitoring system without collection at the time of permitting shall not limit future requirements determined necessary by the commissioner based on the volume of gas generated at the facility, the proximity to residential or business property, or problems experienced at the facility in maintaining vegetative growth or accumulation of gas in site structures.

G. A gas monitoring program must include sampling and analysis for the amount and type of gas generated. The monitoring program must be included in the operations manual for the facility. The program must account for variation in gas generation and migration due to climatic conditions, variation in the amount of waste in place at the facility, and the length of time the waste has been in place. The operations manual must include the techniques to be used to monitor gas at the site.

Missouri

(14) Gas Control.

(A) Requirement. Decomposition gases generated within the sanitary landfill shall be controlled on-site, as necessary, to avoid posing a hazard to the environment or to public health and the safety of occupants of adjacent property.

(B) Satisfactory Compliance.Design.

1. Plans shall contain a monitoring program capable of detecting decomposition gas migration.

A. The monitoring program must specify the type of monitoring and be based on.

(I) Soil conditions;

(II) The hydrogeologic and topographic conditions surrounding the facility; and

(III) The location of facility structures, property boundaries, and off-site features.

B. The monitoring program described in the plans must include:

(I) A written description of the monitoring system, including spacing of monitoring locations and frequency of monitoring;

(II) The results of any gas assessment that has been performed;

(III) The location of all gas monitoring wells shown on a plan sheet;

(IV) A drawing detailing the typical gas monitoring well design;

(V) The design depths and bottom elevations of the gas monitoring wells; and

(VI) Boring logs that support the design gas monitoring well depths.

C. The gas monitoring specified in the plans shall be performed at gas monitoring wells. The monitoring program shall specify how buildings on the landfill property are to be monitored. Gas monitoring wells shall be designed to monitor the unsaturated soil and rock down to an elevation equal to the bottom elevation of the landfill. Gas monitoring wells shall be placed between the landfill and off-site buildings and other features that may be harmed by landfill gas or may easily transmit gas from the landfill. Gas monitoring well locations at the property boundary shall not be more than five hundred feet (500') apart unless the permittee can show that the potential for gas migration is low.

2. Plans shall assess the need for gas control and indicate the location and design of any vents, barriers or other control measure to be provided.

A. The gas control system shall be constructed of materials that are chemically resistant to the solid wastes managed in the sanitary landfill and the gas expected to be generated. These materials shall be specified in the engineering report and the choice of materials justified.

B. The gas control system shall be constructed of materials that are of sufficient strength and thickness to prevent collapse under the pressures exerted by overlying solid wastes, cover and by any equipment used at the sanitary landfill. Overburden pressure calculations, material specifications and system installation procedures shall be included in the engineering report.

C. Maintenance and repair options shall be considered in the design and specified in the engineering report.

D. All applicable permits and approvals necessary to comply with the requirements of the Air Conservation Law and rules promulgated shall be obtained from the department.

E. The plan shall estimate the maximum anticipated rate of gas generation at the disposal area and the length of time over which it is anticipated to be generated. The method by which these calculations are arrived at shall also be included.

(C) Satisfactory Compliance.Operations.

1. Decomposition gases shall not be allowed to migrate laterally from the sanitary landfill to endanger public health and safety or to pose a hazard to the environment. They shall be controlled on-site, flared or vented to the atmosphere directly through the cover, cut-off trenches or ventilation systems in a way that they do not accumulate in explosive or toxic concentrations, especially within structures. (Information on the limits of flammability of gases is available in such references as the Handbook of Chemistry and Physics, 68th ed. Cleveland, Chemical Rubber Publishing Co., 1987.)

2. Decomposition gases shall not be allowed to concentrate above the following

levels:

A. Twenty-five percent (25%) of the lower explosive limit (LEL) or one and one-quarter percent (1.25%) by volume for methane in buildings on the sanitary landfill property; and

B. Fifty percent (50%) of the LEL or two and one-half percent (2.5%) by volume for methane in the soil at the property boundary of the sanitary landfill.

3. For purposes of this section, lower explosive limit (LEL) means the lowest percent by volume of a mixture of explosive gases in air that will propagate a flame at twenty-five degrees Celsius (25°C) and atmospheric pressure.

4. Owners/operators of all sanitary landfills shall implement a methane monitoring program capable of detecting decomposition gas migration in the most likely zone(s) of migration, to ensure that the standards of paragraph (14)(C)2. of this rule are met. Methane monitoring shall be conducted at least quarterly with equipment warranted by the manufacturer to detect explosive gases under the conditions the equipment is to be used. Facilities shall submit the results of this methane monitoring to the department at least quarterly. The electronic submission of methane monitoring data is required. This submission shall be in a format and manner as prescribed by the department.

5. If methane gas levels exceeding the limits specified in paragraph (14)(C)2. of this rule are detected, the owner/operator shall.

A. Notify the department and immediately take all necessary steps to ensure protection of public health and safety which include:

(I) When results of monitoring in on-site or off-site structures indicate levels in excess of those specified, the operator shall take appropriate action to mitigate the effects of landfill gas accumulation in those structures until a permanent remediation is completed. Actions which must be undertaken include:

(a) Notification of the fire department or other appropriate local public safety authorities;

(b) Notification of adjacent property owners and/or occupants;

(c) Ventilation of any confined spaces that may trap decomposition gases or the installation of alarm systems in any confined spaces that may trap decomposition gases; and

(d) Establishment of a temporary methane monitoring program in affected structures.

B. Within seven (7) days of detection, submit to the department a report describing the steps taken to protect public health and safety;

C. Within sixty (60) days of detection, submit to the department for approval a remediation plan designed by a professional engineer for the methane gas releases. A gas control system shall be designed to.

(I) Prevent methane accumulation in on-site and off-site buildings;

(II) Reduce methane concentrations at monitored property boundaries to below compliance levels; and

(III) Reduce methane concentrations off-site to below compliance levels;

D. Landfill gas corrective action plans shall describe the nature and extent of the problem and the proposed remedy. The plan shall be implemented upon departmental approval; and

E. The department may establish alternative schedules for demonstrating compliance with subparagraphs (14)(C)5.B. and C. of this rule.

6. The sanitary landfill shall operate in compliance with all applicable requirements of Chapter 643, RSMo and corresponding rules.

Nebraska

004.17C Explosive Gases Control.

004.17C1 An owner or operator of a municipal solid waste disposal area shall ensure that:

004.17C1(a) The concentration of methane gas generated by the facility does not exceed twenty-five percent (25%) of the lower explosive limit for methane in facility structures (excluding gas control or recovery system components); and

004.17C1(b) The concentration of methane gas does not exceed the lower explosive limit for methane at the facility property boundary.

004.17C2 Owners or operators of a municipal solid waste disposal area shall implement a routine methane monitoring program to ensure that the standards of 004.17C1 of this chapter are met. The monitoring program shall be implemented no later than October 1, 1993 and shall be included in the facility's operational plan.

004.17C2(a) The type and frequency of monitoring shall be determined by the following factors:

004.17C2(a)(1) Soil conditions;

004.17C2(a)(2) The hydrogeologic conditions surrounding the facility;

004.17C2(a)(3) The hydraulic conditions surrounding the facility; and

004.17C2(a)(4) The location of facility structures and property boundaries.

004.17C2(b) The minimum frequency of monitoring shall be quarterly.

004.17C3 If methane gas levels exceeding the limits specified in 004.17C1 of this chapter are detected, an owner or operator shall:

004.17C3(a) Immediately take all necessary steps to ensure protection of human health;

004.17C3(a)(1) Immediately notify the Department;

004.17C3(a)(2) Within seven (7) days of detection, place in the operating record the methane gas levels detected and a description of the steps taken to protect human health;

004.17C3(a)(3) Within sixty (60) days of detection: the owner or operator shall implement a remediation plan for the methane gas releases which describes the nature and extent of the problem and the proposed remedy. A copy of the plan shall be placed in the operating record. The owner or operator shall notify the Department that the plan has been implemented.

004.17C3(a)(4) The Department may establish alternative schedules for compliance with 004.17C3(a)(2) and 004.17C3(a)(3) of this chapter.

North Dakota

1. Methane and other gases from waste decomposition may not be allowed to migrate laterally from the landfill so as to endanger structures, environmental resources, or adjacent properties.
    a) The concentration of methane gas generated by landfills on the facility must not exceed twenty-five percent of the lower explosive limit for methane in structures or appurtenances on the facility.
    b) The concentration of methane gas must not exceed the lower explosive limit for methane at the facility boundary.
    c) Monitoring of methane gas must be conducted at least quarterly, on a schedule proposed by the owner or operator and approved by the department, to assure that the standards of subdivisions a and b are met. The frequency of monitoring must consider such factors as the facility site conditions, hydrogeologic conditions surrounding the site, or climate of the area.
    d) If methane gas levels exceed the standards of subdivisions a and b, the owner or operator must:
        1) Immediately take action to protect public health;
        2) Notify the department within seven days; and
        3) Implement remedial measures within sixty days.

South Dakota

74:27:13:26. Methane gas monitoring. The owner or operator shall measure methane gas concentrations quarterly in all buildings and at the property boundaries. Methane gas may not exceed 25 percent of the lower explosive limit (LEL) of the gas in facility

structures, excluding methane gas system components and may not exceed the LEL of the gas in soils or air at the property boundary.
Facilities which exceed these methane gas concentration levels shall take the following actions;

1) Immediately take all necessary steps to ensure protection of human health and notify the secretary;
2) Within seven days of detection, place in the operating record the methane gas levels detected and a description of the steps taken to protect human health; and
3) Within 60 days of detection, implement a methane gas system which conforms to the requirements of § 74:27:12:20.

Source: 19 SDR 186, effective June 10, 1993.
General Authority: SDCL 34A-6-1.6.
Law Implemented: SDCL 34A-6-1.6.

Wisconsin

NR 507.11 Gas monitoring well design and installation. All gas monitoring wells shall be designed, installed and documented in accordance with ss. NR 507.04, 507.05, 507.06 (1) and (2) and 507.14 and the requirements of this section unless the department approves alternate methods in writing. All gas monitoring wells shall be designed, located, installed and maintained so as to obtain reliable and representative information regarding soil conditions and gas concentrations.
(1) TIMING OF INSTALLATION. Where gas monitoring is required, gas monitoring wells shall be installed at the same time that adjacent areas of the landfill liner are constructed.
(2) DESIGN. All gas monitoring wells shall be constructed with a shut–off valve to prevent the escape of gas from the sampling device and minimize the amount of inflow of air from the atmosphere.
(3) LOCATION. All gas monitoring wells shall meet both of the following:
(a) Wells shall extend to the maximum depth of waste or to the low seasonal groundwater level whichever is encountered first. The screened length shall extend from 5 feet below ground surface to the bottom of the well.
(b) Wells shall be located within 150 feet of the edge of waste unless otherwise approved by the department.
History: Cr. Register, June, 1996, No. 486, eff. 7–1–96.

NR 507.12 Other monitoring device design and installation. The department may require other monitoring devices based on an evaluation of the potential for environmental impacts and the risk those impacts pose to human health and the environment.
History: Cr. Register, June, 1996, No. 486, eff. 7–1–96.

NR 507.22 Gas monitoring. The department may require the owner or operator to install gas monitoring devices, to prepare and submit gas sampling and analysis programs, to monitor for gas migration, and to determine the effectiveness of any gas extraction systems. If explosive gases are detected in any gas monitoring well located

outside of the limits of filling, the department may require any or all of the following: more frequent monitoring, monitoring for pressure or other parameters, and the installation of additional gas monitoring wells which may include nests of wells screened over shorter vertical intervals. Where monitoring is required, the owner or operator shall comply with all of the following:

(1) SAMPLING PARAMETERS. The owner or operator shall sample gas monitoring wells quarterly for percent methane and percent oxygen. Each time a well is sampled, the following shall be recorded: temperature, ground condition, barometric pressure, information as to whether the barometric pressure is rising or falling, and initial and stabilized methane levels. Initial readings are not required to be reported unless the stabilized reading for a particular monitoring point drops to zero.

(2) SAMPLING. Sampling shall be performed with properly calibrated instruments. When a gas monitoring well is being sampled, the gas monitoring instrument shall be attached to the well prior to opening the valve on the gas monitoring well.

(3) REPORTING. Unless otherwise approved by the department, the owner or operator shall report gas monitoring sampling results in accordance with s. NR 507.26 (3).

(4) NOTIFICATION AND REMEDIATION. The owner or operator shall immediately notify the department and take all necessary steps to protect public health and welfare if a stabilized reading exceeds the lower explosive limit of any explosive gas generated by the waste fill in the soils outside of the limits of filling or air within 200 feet of the landfill property boundary or beyond the landfill property boundary, or 25% of the lower explosive limit in any facility structure, excluding gas control or recovery system components. Within 30 days of determining that the applicable gas level was exceeded, the owner or operator shall submit a remediation plan to the department describing the degree and extent of the problem and the proposed remedy. Within 60 days of determining that the applicable gas level was exceeded, the owner or operator shall implement the remediation plan. As additional requirements for owners or operators of landfills meeting the requirements of s. NR 507.15 (2), within 7 days of determining that the applicable gas level was exceeded, the operating record shall be updated to indicate the level detected and the steps taken to protect public health. The proposed remediation plan and notification of its implementation shall also be placed in the operating record. The department may upon written request, approve alternate schedules for submittal and implementation of the remediation plan.

History: Cr. Register, June, 1996, No. 486, eff. 7–1–96.